NATIONAL ENERGY TECHNOLOGY LABORATORY

NETL-RUA
Regional University Alliance

NETL Carnegie Mellon PENNSTATE University of Pittsburgh VirginiaTech WestVirginiaUniversity URS

Research & Engineering Services Contract Requirements Issues and Expectations

Terri Marts, D.Sc. Vice President
RES Program Manager

U.S. DEPARTMENT OF ENERGY

URS Overview

- **URS Corporation**
  - a fully integrated engineering, construction and technical services organization with the capabilities to support every stage of the project life cycle.

- **Our work is focused in four key market sectors:**
  - Federal
  - Infrastructure
  - Power and Industrial
  - Commercial

- **Within each of these markets, our comprehensive skills and expertise are a valued resource to clients around the world in over 40 countries.**

URS Company Highlights

- **Highlights**
  - 46,500 plus employees
  - # 2 Design Firm, ‘Engineering News Record’
  - # 7 Engineering and Construction Firm, ‘Fortune’
  - Revenues over $ 9.25 Billion in FY 09
  - Established in 1904 with Headquarters today in San Francisco, CA
  - Visit us at www.urscorp.com

RES Contract

- **NETL Research & Engineering Services (RES) contract was awarded to URS by NETL with a start up date on 11/15/09**

- **The URS Team provides research and engineering services to the Office of Research and Development (ORD) at NETL.**

- **Responsible for providing skilled personnel, facilities, equipment, materials, supplies and services to support NETL's basic and applied energy research and its implementation of technology developments based on that research, and for providing corresponding infrastructure needs.**

RES Contract

- **Team members:**
  - URS Corporation
  - Midwest Research Institute
  - Five Tier One regional universities consisting of Carnegie Mellon University, West Virginia University, University of Pittsburgh, Penn State University and Virginia Tech. (also known as the University Energy Partnership – UEP)

- **We are dedicated to enabling research to be conducted with the highest degree of technical excellence, and for providing infrastructure and administrative functions that sustain research to be carried out with the highest degree of managerial efficiency and expediency.**

URS Commitment to NETL Success

- **Commitment – As stated by David Pethick, President, URS Global Management & Operations Services, "Our commitment to NETL's success stretches beyond this project. The quest for clean, affordable energy from fossil fuels is critical to the environment, central to our success as a company, and will impact the quality of life enjoyed by our children's children. Our commitment to NETL's mission is strong and unwavering."**

- **URS Credo – "Our success is measured by our client's success."**

Research Grant

- **A Research Grant is:**
  - A financial assistance mechanism providing money, property, or both to an eligible entity to provide research in a particular area or field.
  - The objectives of the research are defined in a general fashion without any formed detailed stipulation as to the direction of such research.
  - Support is not tied to a specific performance outcome nor can it be retracted as a function of performance.
  - The non-profit may jointly own any innovations arising from the project (new software, product, or process).

- **Typically, there is no substantial programmatic involvement with the recipient during performance of the grant.**

Research Contract

- **A Research Contract is:**
  - A formal agreement between legal entities for the procurement of research and development efforts.
  - Research contracts provide financial support to a university researcher to conduct research in a particular area or field under specific stipulations and conditions.
  - These conditions specifically outline the scope and nature of the research, define deliverables, establish ownership, patent rights and licensing arrangements.
  - Contractor approval or review is typically required prior to transfer of knowledge.

- **Typically, there is substantial programmatic involvement with the recipient during performance of a contract.**

- **RES and its activities operate as a Research Contract in contrast to a Research Grant**

Research Contract Expectations

- **Research Contract Checklist:**
  - Provide ideas and input on Research Program Development
  - Finalize and agree on a Scope of Work with URS & NETL
    - Participate in Team/Subteam research efforts and meetings
    - Technical Plan, Finances, Schedules and Resources
    - Perform research to the highest ethical standards and in accordance with University policies on 'Conduct of Research'.
  - Execute the Scope of Work
    - Communicate Changes, Get Approvals (SOW, Travel, Equipment & Staffing)
    - Provide Reports (Monthly Status, Technical, Cost & Publications)
    - Work within Budget Constraints
    - Enter Expenses monthly to ensure timely University billing
    - Notify URS of any proposed changes regarding student researchers
  - Obtain Necessary Training
    - On site work
    - Accountable Property and use of Government Equipment
    - Publications / Presentations of NETL related research
    - Funding flow – research controls
  - Understanding the uniqueness of this collaborative environment
    - Use the NETL-RUA website as a tool to assist you with project related issues

Review of Critical Contract Items

- **Points of Discussion**
  - Contact
  - Contract Awards
  - Site Access
  - Travel
  - Reporting
  - Procurement
  - Notification of Intent to Publish or Present
  - Training

Key Resources – RES Contract

- **Overview of Contacts:**
  - Who to contact – Key Personnel
    - URS Activity Manager – assigned to each & every project also referred to as the Subcontractor Technical Representative (STR)
      - Reference Guide (provided with this presentation)
    - URS Focus Area Managers
      - Chris Montgomery – CBS, Christopher.Montgomery@ur.netl.doe.gov, 304-285-2057
      - Mark Williams – ESD, Mark.Williams@ur.netl.doe.gov, 304-285-4344
      - Doug Wyatt – GES, Douglas.Wyatt@ur.netl.doe.gov, 304-285-4344
      - Vijay Jain – MSE, Vijay.Jain@ur.netl.doe.gov, 541-918-4451
    - Consortium Area Leaders – University Leadership
      - Andy Gellman – CMU, gellman@cmu.edu, 412-268-3848
      - Brian Gleeson – Pitt, bmg36@pitt.edu, 412-648-1185
      - Dan Haworth – PSU, dch12@psu.edu, 814-863-6269
      - Roe-Hoan Yoon – VT, ryoon@vt.edu, 540-231-7056
      - Dick Bajura – WVU, richard.bajura@mail.wvu.edu, 304-293-2867

Contract Awards

- **Contract Project Awards to Universities**
  - Issued by URS contracts
    - Terry McLane – terry.mclane@wsms.com, 803-502-5747
    - Colleen Vollmer – colleen.vollmer@ur.netl.doe.gov, 412-386-7535
  - Issued directly to University Business Offices
    - Information provided to Consortium Area Leads on weekly calls
  - Any & all changes in University Project scope, cost or modification will be routed through contracts
  - Each project, at each University carries a singularly unique task release number which provides direct reference to all project work

Contract Research Timeline

Timeline – Contracted Research – FY 11		
	NETL-URS Actions Fiscal Year	University Actions Calendar Year
Q1	<u>October - December</u> Finalize Research Plans Complete SOWs Complete Budget Plans Identify Resources	<u>January – March</u> Set up New Project Accounts Finalize Researchers on Projects Initiate Project Research Collaboration Meetings
Q2	<u>January – March</u> Conduct Research Obligate Initial Funds Continue Incremental Funding	<u>April – June</u> Progress Reviews Continue FY 11 Research Submit Research Concepts for FY 12
Q3	<u>April – June</u> Begin New Program Development Continue to Implement Research Portfolio	<u>July – September</u> Collaborations & Progress Review Concept Ideas & Plans
Q4	<u>July – September</u> Complete FY 11 Research Produce Products / Publish Results Finalize FY 12 Research Plan	<u>October- December</u> Complete FY 11 Research Work Submit Deliverables Support & Start New Programs Wrap up Assignments Ideas for Improvements

Site Access

- **Temporary Badging**
  - Arriving On-Site at NETL
    - Day Visit – US Citizen – Visitor Badges
      - 24 hour notification required, contact URS activity manager
    - Day Visit – Foreign National – Visitor Badges
      - Clearance required (30-45 day minimum dependent on country of origin), contact URS activity manager or Darcy Sucevich, darcy.sucevich@ur.netl.doe.gov, 412-386-5000
- **Permanent Badging**
  - Per NETL Procedures
  - Pertinent Personal information must be collected for all those seeking picture badges
  - Information entered into an personnel tracking system before one can receive a permanent badge
  - Associated faculty, students and post-docs will be added as information is received

Site Access (cont)

- **Access rules while on site vary depending on the citizenship of the individual**
  - US citizen
  - Foreign National
  - Sensitive Foreign National
    - Algeria, Armenia, Azerbaijan, Belarus, China, Georgia, Hong Kong, India, Iraq, Israel, Kazakhstan, Kyrgyzstan, Libya, Macau, Moldova, Pakistan, Russia, Taiwan, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
  - State Sponsors of Terrorism – NOT allowed on NETL sites and NOT allowed to work on NETL projects unless specifically approved by the Secretary of Energy
    - Cuba, Iran, North Korea, Sudan and Syria
  - Facility, Computer & LAN access will also vary

Foreign Nationals

- **Foreign Nationals at NETL**
  - Access to the site must be approved by the NETL Foreign Visits & Assignments Manager (Kerry Witte)
  - URS will assist in facilitating Foreign National access
    - Contact the URS Activity Manager or Darcy Sucevich, darcy.sucevich@ur.netl.doe.gov, 412-386-5000
  - Security Plans must be developed for each Foreign National
    - Defines permissible facilities and areas of access
    - Defines site access times
    - Notes the host and alternates
  - Escort while on site is not necessary during approved access times – typically 7:30 to 5:00 pm
  - Allow minimum of 30 days for processing of Foreign Nationals
  - Allow minimum of 45 days for processing of Sensitive Foreign Nationals

Travel - Domestic

- Local Travel
  - Any travel that is completed in a single day and does not include any airfare may be considered local travel. This will include travel from the universities to the NETL sites as well as to other project related local destinations for meetings. Reimbursements for this type of local travel will be made without the necessity of a Travel Authorization for mileage, tolls and parking. No per diem expense for M&IE will be considered for reimbursement as local travel. Travel to an NETL site or other local destination that requires reimbursement of expenses beyond mileage, tolls and parking requires the use of a Travel Authorization.
- Non-Local Travel
  - Any travel that includes an overnight stay, airfare or meals will be considered non-local travel & must have been pre-approved through the normal Travel Authorization process (Form 540.8-14). This includes travel to and from NETL sites and any other project related travel that includes airfare or an overnight stay

Travel – Domestic & Foreign

  - URS is seeking pre-approval on specific trips requested in the University FY 11 cost plans. Universities will be notified when approval of these trips is obtained.
  - Principal Investigators who did not identify specific trips in their final cost plans must obtain travel authorization prior to travel (Form 540.8-14).
- **Foreign Travel**
  - May be approved on the RES contract (Form 551.1-1)
  - Must be cleared with NETL Team Leader before paperwork initiation - contact Paul Deffenbaugh of URS for guidance, paul.deffenbaugh@ur.netl.doe.gov, 412-386-6070 or URS Activity Manager
  - 60 Day notification required
  - Final Travel approval is obtained through the Secretary of Energy's office

Notice of Intent to Publish

- **A Notice of Intent (NOI) to publish or present a paper, or present a poster, is required by NETL for all intellectual property and research work performed under the RES contract for presentation or publication as follows:**
  - PowerPoint /Oral Presentation
  - Poster Presentation
  - Paper
  - Manuscript
  - Abstracts *

*If submitting abstracts for acceptance to a conference, meeting, publication, etc., you will still be required to give notice of intent for the related presentation or publication prior to its release date.

Notice of Intent to Publish (p2)

- **Purpose of Notification:**
  - Ensures that a database record is maintained for all papers and presentations based on the work under the university subcontracts
  - It provides a quality assurance check so that all work submitted follows subcontract stipulations and NETL guidelines as appropriate
  - It provides NETL the opportunity to review & comment on the work
    - Submission is required at least thirty days (30) prior to release.
    - NETL reserves the right to remove its name/reference from any materials planned for release

Reporting

- **Cost Reporting**
  - University Accounting Offices report their task incurred costs to the RES business offices monthly.
- **Technical Reporting**
  - Principal Investigators (PIs) report research progress monthly to your URS Activity Manager for incorporation into the URS monthly reporting deliverable.
  - Principal Investigators report research results per SOW requirements
- **Annual Reports**
  - CALs annually report accomplishments, research productivity, growth activities, research highlights, special awards, honors & recognitions and external grants/proposals
- **Publications**
  - Principal Investigators to submit all NETL-RUA publications upon completion of publication work.

Procurement

- **Equipment**
  - Universities are not authorized to purchase ‘accountable property’. (Accountable Property Guide previously provide to all PIs). Please route requests for this property through URS Activity Manager. URS will procure and ship to the Universities.
- **Subcontracts**
  - Universities are not authorized to procure subcontract services. URS will place necessary subcontracts for the PI. Please discuss any request with URS Activity Manager.
- **Software**
  - Procurements of software may be made with approval from the URS Procurement Representative (Gordon Shaffer, gordon.shaffer@wsms.com, 304-225-5137). Please route request through URS Activity Manager.
- **Supplies & Materials**
  - Procurements may be made for certain supplies & materials. Consult your URS activity manager for support of this effort.

Required Training

- **All NETL, URS and University Personnel must complete NETL provided general, safety and project specific training before performing research**
- **General Training**
  - Security training immediately upon entering the site the first time
  - Cyber Security Training in order to use NETL desktop computers & subsequent Security Refresher
    - User name & password issued upon completion
  - Computer Based Training Modules
    - Coordinated through URS Activity Managers (& FN hosts)
    - Requires personnel to complete CBT Hazards Survey
    - Assistance to be provided through RES and/or NETL
    - Results in 10-15 required modules
    - Allow 30 minutes per module
    - Recurring Annual Training

Specialized Training

- **Safety Training**
  - Most handled through computer courses
  - Annual training for numerous modules
  - Various other training offerings as needed & when identified
- **Project Specific Training**
  - Varies by Project Needs
    - Relevant to Hazards associated with project operations
    - May require acknowledgement with project specific documentation
      - Standard Operating Procedures & Vendor Manuals
      - Hazard Charts & Approved Mitigations
    - May require hands-on experience
      - Identified by the URS Activity manager or NETL Team Lead
      - Completion of Project Training requirements - Captured on Standard NETL form & placed in the official SARS project file
      - Personnel not permitted in the laboratory (unless escorted by Team Leader or designee) until form is completed, signed and placed in file
      - Operation of laboratory equipment not permitted until completion

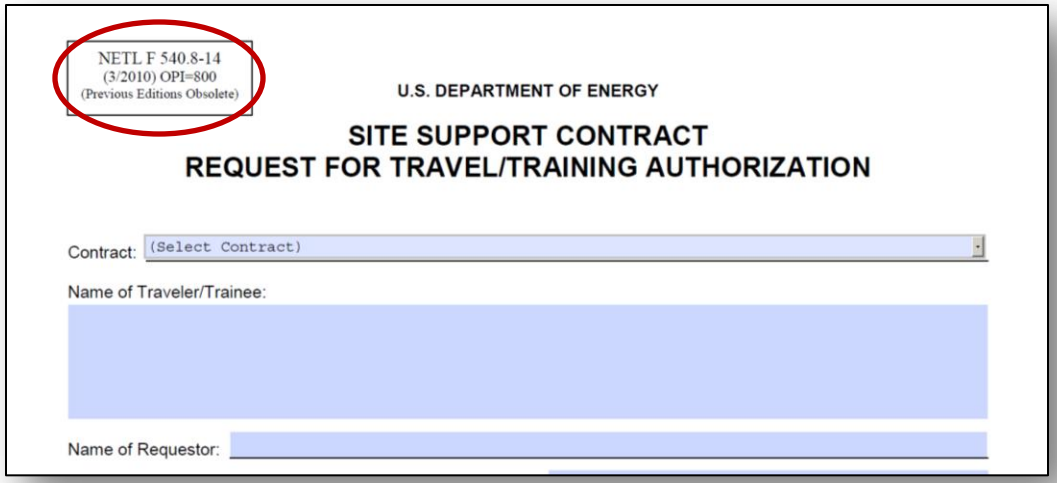
Summary

- **Key Points of Entry to NETL**
  - NETL Team Leader – Subteam Manager
  - URS Focus Area Manager
  - URS Activity Manager
  - Consortium Area Lead at your University
  - Members Only portion of website
    - NETL-RUA Share point, Access information will be emailed to all Principal Investigators and Associated Researchers

?? Questions ? ?

Supplemental Information

Requests for Travel/Training Authorization and Approval of Foreign Travel



NETL F 540.8-14
(3/2010) OPI=800
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

SITE SUPPORT CONTRACT
REQUEST FOR TRAVEL/TRAINING AUTHORIZATION

Contract: (Select Contract)

Name of Traveler/Trainee:

Name of Requestor:

NETL F 551.1-1
(10/2008) OPI=320
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

REQUEST FOR APPROVAL OF FOREIGN TRAVEL

This form is provided as a convenience for the collection of Foreign Travel Request data. The form is intended for use as an offline resource to collect data necessary to support the Foreign Travel Management System (FTMS). Completion of the form is not considered sufficient in itself for satisfying DOE Order 551.1A. The data must still be entered into the FTMS for Department of Energy (DOE) tracking and monitoring. Specific questions on Foreign Travel or the completion of this form should be directed to your sites Senior FTMS Organizational Point of Contact (Sr. OPOC).

SECTION I -- TRAVEL INFORMATION (To Be Completed by Traveler)		
1. Name *(Last, First, Middle)*:		2. Social Security Number:
3. Passport Number:	Passport Expiration Date *(mm/dd/yyyy)*:	4. Birth Date *(mm/dd/yyyy)*:

NETL-RUA FY 11 Activity Managers Contact Information

christopher.montgomery@ur.netl.doe.gov
304-285-2057
kevin.resnik@ur.netl.doe.gov
412-386-5015
stephen.carpenter@ur.netl.doe.gov
304-285-1312
edward.robey@ur.netl.doe.gov
304-285-4325
travis.kirby@ur.netl.doe.gov
304-285-4198
alka.jain@ur.netl.doe.gov
541-918-4482
w.sams@ur.netl.doe.gov (Neal)
304-285-4068
richard.bergen@ur.netl.doe.gov (Mike)
304-285-1316

jeffery.ilconich@ur.netl.doe.gov
412-386-6862
joel.siegel@ur.netl.doe.gov
412-386-7458
dustin.crandall@ur.netl.doe.gov
304-285-1384
vijay.jain@ur.netl.doe.gov
541-918-4451
paul.zandhuis@ur.netl.doe.gov
412-386-4712
tom.kalapos@ur.netl.doe.gov
412-386-4096
kevin.moore@ur.netl.doe.gov
304-285-4018
jinesh.jain@ur.netl.doe.gov
412-386-7470

Project Summary

Organization of FY11 RES Research Teams

Team	Sub-Team	CLIN/Activity/ Element Number	Element	Team Manager	Sub-Team Manager	Activity Manager	University PI
Advanced Combustion	Advanced Concepts	3.691.241.001.003	Advanced concepts	Summers	Ochs	Carpenter	Ochs
	Chemical Looping	3.691.241.001.002	Synthesis and Characterization of Nano-Structured Materials for CO2 and	Summers	Straub	Carpenter	Veser
	Materials Characterization	5.691.241.001.005	Multiscale Microstructure Analysis of High-Temperature Structural Materials	Summers	Holcomb/Hawk	Jain, Vijay	Murayama
	Oxycombustion Materials Development	5.691.241.001.005	Effects of Deposits Relevant to Oxyfuel Environments on Alloy/Coating Degradation	Summers	Holcomb	Jain, Vijay	Meier
	Oxyfuel & Co-firing	2.691.241.001.000	PDF-Based Models for Oxy-Coal Combustion	Summers	Casleton	Montgomery	Haworth
	Oxyfuel & Co-firing	2.691.241.001.000	Oxy-Fuel Pulverized Coal Combustion Simulation and Design	Summers	Huckaby	Montgomery	Marzouk
	Oxyfuel & Co-firing	3.691.241.001.001	Oxy-fuel and co-firing	Summers	Casleton	Carpenter	Shaw
Advanced Gasification	Biomass Processing	3.671.238.001.001	The Mechanical and Transport Characteristics of Coal-Biomass Mixtures – Application to Dry-Feed Systems for AIGCC	Guenther	Vanessendelft	Bergen	Elsworth
Advanced Gasification	Biomass Processing	3.671.238.001.002	Mechanical Property Evaluation of Torrefied Biomass Materials with Correlation to Grinding Efficiency	Guenther	Vanessendelft	Bergen	Kang
	Co-gasficiation Reactions & Kinetics	2.671.238.001.000	GASIFICATION COAL AND BIOMASS BLENDS	Guenther	Breault	Montgomery	Pisupati

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	Co-gasficiation Reactions & Kinetics	3.671.884.001.000	Modeling and predicting biomass fluidization to improve co-gasification	Guenther	Breault	Resnik	Battaglia
	Co-gasficiation Reactions & Kinetics	3.671.238.002.003	RUA Support for Co-gasification Reactions and Kinetics	Guenther	Breault	Bergen	Weiland
	Co-gasficiation Reactions & Kinetics	3.671.884.001.000	RUA Support for Development of Coal gasification Kinetics for CFD	Guenther	Breault	Resnik	Turton
	Refractory Development	5.671.238.001.009	Slag Refractory Interactions During Mixed Carbon Feedstock Gasification in Slagging Gasifiers	Guenther	Bennett	Jain, Vijay	Seetharaman
	Refractory Development	5.671.238.001.009	Investigation of microstrucutre and chemisty orgin of corrosion of refractory materials for slagging gasifiers	Guenther	Bennett	Jain, Vijay	Song
	Device and Systems Modeling	2.671.238.001.000	Entrained-Flow Gasification Dynamics	Guenther	Zitney	Montgomery	Turton
	Multiphase Flow Modeling	2.672.232.001.000	Porting MFIX to GPU Architecture	Guenther	Zitney	Montgomery	Dietiker
Advanced Simulation	Multiphase Flow Modeling	2.670.241.006.000	The Role of Simulation and Modeling in Accelerating CO2 Capture Technology Commercialization	Guenther	Shanham	Montgomery	Rubin
	CCSI	2.672.241.001.000	Modular Framework for Design & Optimization of Carbon Capture Systems: Simultaneous	Guenther	Miller	Montgomery	Grossmann

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	CCSI	2.672.241.001.000	Modular Framework for Design & Optimization of Carbon Capture Systems: Simultaneous Optimization of Flowsheet, Heat Recovery, and Water Network	Guenther	Miller	Montgomery	Sahinidis
	CCSI	2.672.251.001.000	Process Synthesis, Analysis and Optimization of Pressure Swing Adsorption (PSA) for CO2 Capture	Guenther	Miller	Montgomery	Biegler
	CCSI	2.672.251.001.000	IGCC Advanced process control and Sensor placement in an IGCC plant with CO2 capture	Guenther	Zitney	Montgomery	Bhattacharyya
	CCSI	3.672.238.001.000	Heat and Mass Transfer in Porous CO2 Sorbent Particles	Guenther	Miller	Robey	Tafti
	Multiphase Flow Modeling	2.672.232.001.000	Integrated Environmental Control Model	Guenther	Shahnam	Montgomery	Rubin
	Multiphase Flow Modeling	2.672.232.001.000	Parallel Formulations for the Discrete Element Method (DEM) - MFIX	Guenther	Shahnam	Montgomery	Tafti
	Multiphase Flow Modeling	2.672.232.001.000	Improving cut cell technique in MFIX	Guenther	Shahnam	Montgomery	Dietiker
Capture	Advanced Concepts	5.611.251.001.000	Ion exchange resins as CO2 sorbents for post-combustion CO2 capture	Berry	Gray	Zandhuis	Kitchin
Capture	CO2 Pipe Transport	5.611.251.001.000	Electrochemical In-situ Monitoring of Metal Degradation in Carbon Sequestration Processes	Berry	Holcomb	Zandhuis	Lvov
	Flue Gas Sorbent	5.611.241.001.010	Next Generation Solid Molecular Basket Sorbents with Desired Nano-structure for CO2 Capture from Flue Gas	Berry	Pennline	Zandhuis	Song

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	Solvents	2.611.251.001.000	Accurate Control of CO2 Chemical Reactions with Ionic Liquids Through Cation Composition Variation Changed URS to Pitt	Berry	Luebke	Montgomery	Johnson
	Solvents	2.611.251.001.000	Accurate Force Fields for Modeling CO2 Capture by Ionic Liquids	Berry	Luebke	Montgomery	Jordan
	Solvents	3.611.251.001.001	RUA Suppoer for CO2 philic oligomers and phase change solvents for pre-combustion CO2 capture	Berry	Luebke	Resnik	Enick
	Solvents	5.611.251.000.000	Phase Change Amines: Next generation materials for CO2 capture	Berry	Luebke	Zandhuis	Li
	Sorbent Reactor Development	3.611.251.001.003	A Novel Rapid-Cycle Process for CO2 Capture from Flue Gas of Coal-fired Power Plants	Berry	Shadle	Carpenter	Song
	Syn Gas Sorbent	2.611.251.001.000	Modeling of Nanoporous Materials for CO2 Capture	Berry	Siriwardane	Montgomery	Johnson
	Syn Gas Sorbent	2.611.251.001.000	High-temperature CO2 separation from gasifier effluents	Berry	Siriwardane	Montgomery	Janik
Capture	Syn Gas Sorbent	3.611.251.001.002	Innovative Ionic Liquid-based sorbents for CO2 capture	Berry	Siriwardane	Resnik	Li
CO2 Storage Reservoir	Brine EOS	4.600.251.002.001	Modeling of CO2 Water Rock Interactions - Phase Equilibria in CO2-Brine-Rock Systems - RES	Goodman	Dilmore	Jain, Alka	Lvov
	Brine EOS	4.600.251.002.001	Volumetric Constraints Associated with Carbon Sequestration in Geological Reservoirs	Goodman	Dilmore	Jain, Alka	Bodnar

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	Coal	4.600.251.002.001	Investigate basin-specific factors affecting CO2 storage capacity through U.S. national mapping for un-mineable coal seams identified with storage capacity	Goodman	Soong	Jain	Hur/Harbert
	Resource Assessment	4.600.251.002.001	Refining Small-Scale Estimates of Geological Sequestration Resource Using Site-Specific Estimates of Sequestration Capacity–A Pennsylvania Case Study	Goodman	Goodman	Jain, Alka	McCoy
	Resource Assessment	4.600.251.002.001	NatCarb as a Tool for Resource Assessment	Goodman	Goodman	Jain, Alka	Carr
CO2 Utilization	Photo-Electro	2.661.251.001.000	Photocatalytic Reduction of CO2	Taylor	Matranga	Montgomery	Jordan
	Plasma	3.661.251.001.000	CO2 to Value Added Chemicals using Low-Temperature Plasma	Taylor	Gallagher	Bergen	Scime
	Thermal	5.662.884.001.016	Hydrogen production from the water-gas shift reaction; Catalysis Synthesis and Characterization	Taylor	Natesakhawat	Zandhuis	Natesakhawat
CO2-Water-Rock	CO2 mineralization	4.600.251.002.005	Model Development for Hydrate Formation and Displacement	Soong	O'Connor	Ilconich	Yoon
	Fluid Rock Interactions and Groundwater Chemistry	4.600.251.002.005	Identify key changes in fluid-based organic composition due to CO2 and CO2-water-rock reactions and Determining the potential for EPA target contaminant release in major U.S. aquifers potentially affected by carbon sequestration	Soong	Hakala	Ilconich	Karamalidis

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	Fluid Rock Interactions and Groundwater Chemistry	4.600.251.002.005	Volcanic natural analogs for CO2 sequestration	Soong	Lopano	Ilconich	Bodnar
	Fluid Rock Interactions and Groundwater Chemistry	4.600.251.002.005	Developing Reliable Rate Laws from Mineral-Solution Rate Data: A Database and Data Analysis Strategy	Soong	Lopano	Ilconich	Rimstidt
	Fluid Rock Interactions and Groundwater Chemistry	4.600.251.002.005	Developing Reliable Rate Laws from Mineral-Solution Rate Data: A Database and Data Analysis Strategy	Soong	Lopano	Ilconich	Brantley
	Fluid Rock Interactions and Groundwater Chemistry	4.600.251.002.005	Analysis of the economic consequences of CO2 intrusion into groundwater aquifiers	Soong	Lopano	Ilconich	Sperow
CO2-Water-Rock	Hydrophobic Hydrophilic Interactions	4.600.251.002.005	Investigation of CO2 Capture Mechanisms by Clay Minerals using Quantum Mechanical Theory	Soong	Romanov	Ilconich	Jordan
Energy Storage	Batteries	5.682.222.001.000	New High Energy Density Magnesium Battery Concepts for Stationary Power Smart Electrical	Alman	Manivannan	Jain, Vijay	Kumta
	Batteries	5.682.222.001.000	New High Energy Density Magnesium Battery Concepts for Stationary Power Smart Electrical	Alman	Manivannan	Jain, Vijay	Wang
Fuel Cells	Advanced Fuel Cells	3.621.248.001.000	Integrated controls for SOFC/GT Hybrid generation systems	Gemmen	Gerdes	Moore	Banta
	Analytical Characterization	5.621.248.001.003	Multi-scale Determination of Structural Features in Nano-Composite Electrochemical Materials for Improved SOFCs	Gemmen	Gerdes	Kalapos	Salvador

Project Summary

Organization of FY11 RES Research Teams

Team	Sub-Team	CLIN/Activity/ Element Number	Element	Team Manager	Sub-Team Manager	Activity Manager	University PI
	Analytical Characterization	5.621.248.001.003	Microstructure Analysis of SOFC Anode Operating on Fossil-derived Fuels	Gemmen	Gerdes	Kalapos	Song
	Anode RxN and Transport	5.621.248.001.003	Electrochemical Evaluation of LMA-SOFC Performance	Gemmen	Gerdes	Kalapos	Lvov
	Cathode Materials	5.621.248.001.003	Mesoporous Nanoscale Electrocatalysts SOFC Cathode performance Improvements	Gemmen	Gerdes	Kalapos	Salvador
	Cathode Materials	5.621.248.001.003	Testing and Modeling of the Thermomechanical Behavior and Processing of Infiltrated Cathode Solid Oxide Fuel Cells	Gemmen	Gerdes	Kalapos	Messing
	Cathode Materials	5.621.248.001.003	Microstructural Engineering of Porous SOFC Cathodes	Gemmen	Gerdes	Kalapos	Sabolsky
	Cathode Materials	5.621.248.001.003	Design and optimization of SOFC cathode architecture	Gemmen	Gerdes	Kalapos	Wu
Fuel Cells	Cathode RxN and Transport	2.621.248.001.000	Phase-field Modeling of Microstructure Evolution and Electrochemical Transport in SOFC Cathodes	Gemmen	Gerdes	Montgomery	Chen
	Cathode RxN and Transport	2.621.248.001.000	Integrated Multi-Dimensional, Multi-Scale Cathode Model	Gemmen	Gerdes	Montgomery	Celik
	Cathode RxN and Transport	2.621.248.001.000	Modeling and characterization of fundamental kinetics in SOFC Cathode	Gemmen	Gerdes	Montgomery	Liu
	Cathode RxN and Transport	5.621.248.001.003	SOFC electrode structures and reference electrodes.	Gemmen	Gerdes	Kalapos	Finklea
Fuels	Characterization and Basic Sciences	5.662.884.001.016	Surface structure sensitivity of FT and RWGS catalysis - High throughput studies 01.1.01 (DB)	Taylor	Sorescu	Zandhuis	Gellman

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	Characterization and Basic Sciences	5.662.884.001.016	Heterogeneous catalysts for water-gas shift reactions	Taylor	Sorescu	Zandhuis	Yang
	Computational	2.662.884.001.000	Development and application of a ReaxFF reactive force field for Fischer-Tropsch catalysis	Taylor	Sorescu	Montgomery	van Duin
	Hydrocarbon Reforming	3.662.248.001.000	Fuel cell reforming	Taylor	Shekhawat	Bergen	Shekhawat
	Syn Gas FT	5.662.884.001.016	Design and Testing of Robust Catalysts for Fischer-Tropsch Processing of Synthesis Gas containing Impurities associated with Domestic Coal and Biomass	Taylor	Shekhawat	Zandhuis	Kugler
	Syn Gas WGS	5.662.884.001.016	Hydrogen production from the water-gas shift reaction; Catalysis Synthesis and Characterization	Taylor	Shekhawat	Zandhuis	Veser
Fuels	Syn Gas WGS	5.662.884.001.016	Multifunctional Nanomaterials for Water-Gas-Shift Catalysis in Contaminated Fuel Streams	Taylor	Shekhawat	Zandhuis	Veser
	Syn Gas WGS	5.662.884.001.016	Process Integration Strategies Involving Water-Gas Shift Promoted by Simultaneous Selective Sorption of Carbon Dioxide	Taylor	Shekhawat	Zandhuis	Dadyburjor
Membrane	CO2	5.681.241.001.019	CO2 Capture Membranes	Alman	Luebke	Kalapos	Rosi
	CO2	5.681.241.001.017	NMR spectroscopic studies of Ionic liquids for CO2 capture and separation	Alman	Luebke	Kalapos	Achary
	CO2	5.681.251.001.017	CO2 selective membranes based on CO2 philic oligomers	Alman	Luebke	Kalapos	Enick
	CO2	2.681.241.001.000	Confinement of Ionic Liquids	Alman	Luebke	Montgomery	Shi

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	H2	5.681.884.001.018	High-Permeance, Poison Tolerant Alloys for Hydrogen Separation Applications	Alman	Howard	Kalapos	Miller
	H2	2.681.884.001.000	Diffusivity of Hydrogen in Low-Cost Membrane Materials	Alman	Howard	Montgomery	Widom
	H2	5.681.884.001.018	Protective-Scale Evolution and Stability in Complex Environments	Alman	Howard	Kalapos	Gleeson
	H2	5.681.884.001.018	Development and Processing of Thin Film Membranes Including Membrane Reactors and Inorganic, Nonmetallic Membranes Systems for H2 Separation	Alman	Howard	Kalapos	Oyama
Multi-scale Multiphase Flow	Geomechanics & Fracture Flow	4.600.251.002.006	Use of pressure and displacement signatures to estimate reservoir storage potential and identify possible fault activation in the cap rock during CO2 injection	Soong	McIntyre	Crandall	Siriwardane
	Geomechanics & Fracture Flow	4.600.251.002.006	Modeling Fluid Flow Behavior in Naturally Fractured Unconventional Reservoirs	Soong	McIntyre	Crandall	Mohaghegh
	Pore Flow	4.600.251.002.006	Experimental Investigation of Conditions Affecting Wellbore Integrity due to Chemical Reaction using X-ray microCT imaging	Soong	Bromhal	Crandall	Karpyn
	Pore Flow	4.600.251.002.005	Geochemical transformations caused by CO2 injection or leakage	Soong	Bromhal	Crandall	Li
QMVA	Integrated Modeling	4.600.251.002.003	3D Reflection Seismic Modeling for Perspective CO2 Storage Site - NRAP	Martello	Wells	Siegel	Harbert

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	Geochemical Signals	4.600.251.002.003	Biogeochemical Indicators and processes for development of novel MVA Tools - QMVA	Martello	Schroeder	Siegel	Capo
	Geochemical Signals	4.600.251.002.003	Partitioning CO2 dissolution and mineral dissolution/precipitation processes in saline aquifers: Potential role of stable carbon isotopes	Martello	Schroeder	Siegel	Sharma
QMVA	Geochemical Signals	4.600.251.002.003	(Bio)geochemical indicators and processes for development of novel MVA tools: Comparison of CO2- measurement methods, rare earth element indicators and sensors in complex geochemical and geological settings	Martello	Schroeder	Siegel	Vesper
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.003	Carbon Nanotube Based Sensors for CO2 Monitoring	Martello	Kutchko	Siegel	Star
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.003	Electro-optic CO2 sensor and wireless network	Martello	Kutchko	Siegel	Wang
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.003	Developing new seismic waveform model regression technologies for improved geologic evaluation for reservoir storage capacity and retention permanence in the subsurface	Martello	Bromhal	Siegel	Gao

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	Strategic Monitoring and Mitigation-MVA	4.600.251.002.003	Hydrogeologic Monitoring of Aquifiers for NETL Monitoring, Verification and Accounting (MVA) Efforts	Martello	Wells	Siegel	Rauch
Quantitative Risk Assessment	System Analysis	4.600.251.002.007	TMS / IBM Visualization Lab	Goodman	Dilmore	Siegel	Jursa
Quantitative Risk Assessment	Groundwater Impacts	4.600.251.002.007	Geochemical transformations caused by CO2 injection or leakage - Burgos	Goodman	Hakala	Sams	Burgos
	Reservoir Issues	4.600.251.002.007	Influence of faults and fractures on reservoir performance, seal integrity, and other subsurface layers	Goodman	Bromhal	Sams	Siriwardane
	Strategic Monitoring and Mitigation-Analog	4.600.251.002.007	Natural isotope MVA tools for NRAP strategic monitoring	Goodman	Hakala	Sams	Capo
	Strategic Monitoring and Mitigation-Analog	4.600.251.002.007	Development of New Natural Isotope Tracers for Drilling-related Fluids	Goodman	Hakala	Sams	Stewart
	Strategic Monitoring and Mitigation-Analog	4.600.251.002.007	(Bio)geochemical indicators and processes for development of novel MVA tools: Comparison of	Goodman	Hakala	Sams	Vesper
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.007	Risk Assessment in CO2 Geologic Sequestration (04.3.01 DB)	Goodman	Dilmore	Sams	Sahinidis

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	Strategic Monitoring and Mitigation-MVA	4.600.251.002.007	Development of an Integrated Risk Assessment Framework to Support Adaptive Site Management for Geologic Carbon Dioxide Sequestration	Goodman	Wells	Sams	Small
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.007	Seismic Tomography for Carbon Sequestration Risk Analysis - QMVA	Goodman	Wells	Sams	Westman
Quantitative Risk Assessment	Strategic Monitoring and Mitigation-MVA	4.600.251.002.007	Near Surface Modeling of Carbon Dioxide Leakage	Goodman	Wells	Sams	Gray
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.007	Risk Analysis of Carbon Sequestration Projects in the scope of System Analysis	Goodman	Dilmore	Sams	Mohaghegh
	Strategic Monitoring and Mitigation-MVA	4.600.251.002.007	Analysis of Data on Faults and Fractures and Its Application to the Assesment of Potential Migration of Injected CO2 in the Deep Subsurface, Including Leakage through Primary Seals	Goodman	Wells	Sams	Wilson
	System Analysis	4.600.251.002.007	Risk-informed Site Selection for the Long Term Geologic Storage of CO2	Goodman	Dilmore	Sams	Blumsack
Seal Integrity	Geochemistry	4.600.251.002.002	Acid Gas Interaction with Seal Materials under Geologic Sequestration Conditions	Summers	O'Connor	Jain, Alka	Dzombak
	Geochemistry	4.600.251.002.002	Multiphase Reactive Transport Processes Associated with Wellbore Cement Degradation during CO2 Leakage	Summers	O'Connor	Jain, Alka	Li

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	Geomechanics and Flow	4.600.251.002.002		Summers	Strazisar	Jain, Alka	Hesse
Sensors	Electrochemical	3.623.220.001.002	Support for Surface acoustic wave sensor development	Gemmen	Chorpening	Kirby	Greve
	Electrochemical	3.621.220.001.002	RUA Support for Synthesis and Characterization of SiC Nanostructures for Sensor Development	Gemmen	Chorpening	Kirby	Star
Sensors	Optical	3.623.220.001.001	RUA Support for Raman gas composition monitor improvement	Gemmen	Chorpening	Kirby	Falk
Turbines	Aerothermal	3.622.243.001.001	Aerothermal Research for Coal-Gas Based Turbine Systems	Gemmen	Alvin	Robey	Chyu
	Aerothermal	3.622.243.001.001	Development of a Rotating Rig to Study Secondary flow Leakages and Aerothermal Cooling	Gemmen	Alvin	Robey	Thole
	Aerothermal	3.622.243.001.001	Advanced Film Cooling Designs for Reduced Coolant Usage and Improved Overall Cooling Performance for Syngas based Gas Turbines	Gemmen	Alvin	Robey	Ekkad
	Characterization	5.622.243.001.021	Advanced Characterization of Alloy/Scale Interfaces for Guiding Optimized Surface Stability	Gemmen	Hawk	Kalapos	Seetharaman
	Combustion Science	3.622.243.001.002	LES-FDF simulations of half-scale Sydney Burner	Gemmen	Strakey	Robey	Givi
	Combustion Science	3.622.243.001.002	Utilization of Exhaust Gas Recirculation for Control of Combustion Instabilities in Gas Turbines	Gemmen	Strakey	Robey	Santavicca/Strakey

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	Combustion Science	3.622.243.001.002	Scaling Methods of Combustion Dynamics, Lean Blowout, Flashback and Emissions, for the Design of EGR in Gas Turbines	Gemmen	Strakey	Robey	Vandsburger
	Combustion Science	3.622.241.001.002	RUA Support for Model Verfiication and Exhaust Gas Recycle Activity number from CLIN 3 - 3.622.243.001.002 - verify?	Gemmen	Strakey	Robey	Celik
Turbines	Computational Materials	2.622.243.001.000	Computational and Experimental Investigations of Thermodynamic and Physical Properties of Complex Slags in Electro Slag Remelting (ESR)	Gemmen	Hawk	Montgomery	Liu
	Materials Development	5.622.243.001.021	Strengthening and Oxidation Protection of Nb- and Ta-base Alloys for Ultra-High-Temperature Applications	Gemmen	Hawk	Kalapos	Meier
	Thermal Barrier Coatings	5.622.243.001.021	Diffusion Barrier Coatings for Achieving Extended Component Service at Ultra-High Temperatures	Gemmen	Alvin	Kalapos	Gleeson
	Thermal Barrier Coatings	5.622.243.001.021	TBC Durability/Damage Assessment of Advanced Turbine Components	Gemmen	Alvin	Kalapos	Kang